Biologics Vs Biosimilars: Addressing Affordability And Access In Indian Healthcare


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Abstract

Biologics have revolutionised treatment of cancer, diabetes, rheumatoid arthritis, and other chronic diseases by offering targeted and effective therapies. However, their high-cost limits access, particularly in developing countries like India where out-of-pocket healthcare expenses are significant. Biosimilars, which are highly similar versions of approved biologics, provide a safe, effective, and more affordable alternative, often at 30-70% lower prices. India has made early progress with over 100 approved similar biologics and updated regulatory guidelines, yet challenges in manufacturing complexity, regulatory enforcement, pharmacovigilance, and stakeholder confidence persist. This review examines the science of biologics and biosimilars, India's regulatory framework, market status, key challenges, opportunities, and recommendations. A full shift towards quality assured biosimilars is essential to improve patient access, reduce financial burden, strengthen India's biopharmaceutical industry, and position the country as a global hub for affordable biologics. Robust regulation, investment in infrastructure, education, and real-world evidence generation will be critical for success.

Keywords: Biosimilars, Regulatory guidelines, Biotechnology

1. Introduction

Biologics are large, complex therapeutic proteins or other molecules produced using living cells. They include monoclonal antibodies, insulin, erythropoietin, and growth factors used to treat serious conditions such as cancer, autoimmune disorders, and diabetes. These medicines have transformed patient outcomes but come at a steep price, often running into lakhs of

rupees per year of treatment. In India, where most healthcare costs are borne directly by patients, many families cannot afford originator biologics (4).

Biosimilars are not identical copies like small-molecule generics but are highly similar to the reference (originator) biologic in structure, function, safety, and efficacy. They undergo rigorous comparability exercises to demonstrate no clinically meaningful differences. When patents on original biologics expire, biosimilars enter the market at significantly lower costs, expanding access without compromising quality. India, already a global leader in generic medicines, has an opportunity to replicate this success in the biosimilar space. With a large patient population suffering from chronic diseases and growing patent expiries worldwide, the shift to biosimilars is not just desirable but necessary for public health and economic growth.

2. What Are Biologics and Biosimilars?

Biologics are produced through biotechnology processes involving genetically engineered cells. Their complex structure, including post-translational modifications like glycosylation, makes them sensitive to manufacturing changes. Even minor variations can influence immunogenicity or potency (5).

Biosimilars must prove "high similarity" through a stepwise approach: extensive analytical characterisation, non-clinical studies, pharmacokinetic/ pharmacodynamic (PK/PD) equivalence, and, where needed, comparative clinical trials. Regulatory agencies use the "totality of evidence" to approve them. Unlike generics, biosimilars cannot be automatically substituted in all jurisdictions due to potential subtle differences (7).

Table 1. Comparison of Generics vs Biosimilars

	Generics	**Biosimilars**
Origin	Chemical & therapeutic equivalents of chemical drugs	Copies of existing biological medicinal products or protein drugs.
Structure	Smaller, less complex, one dimensional (1D)	Large & complicated (100-1000x), three dimensional (3D)
Molecular weight	Low	High
Stability	More stable	Sensitive to change in physical conditions
Route	Oral	Injection/inhalational
Manufacturing procedure	Less complex	Complex, lengthy & expensive (requires different cell lines)

Registration procedure	Simple, Abbreviated New Drug Application (ANDA)	Complicated (EMA/FDA)

The key differences in manufacturing, similarity, and substitution requirements are represented in Figure 1. This flowchart shows the stepwise comparability exercise, starting from quality attributes through clinical studies, with possible re-optimisation loops.

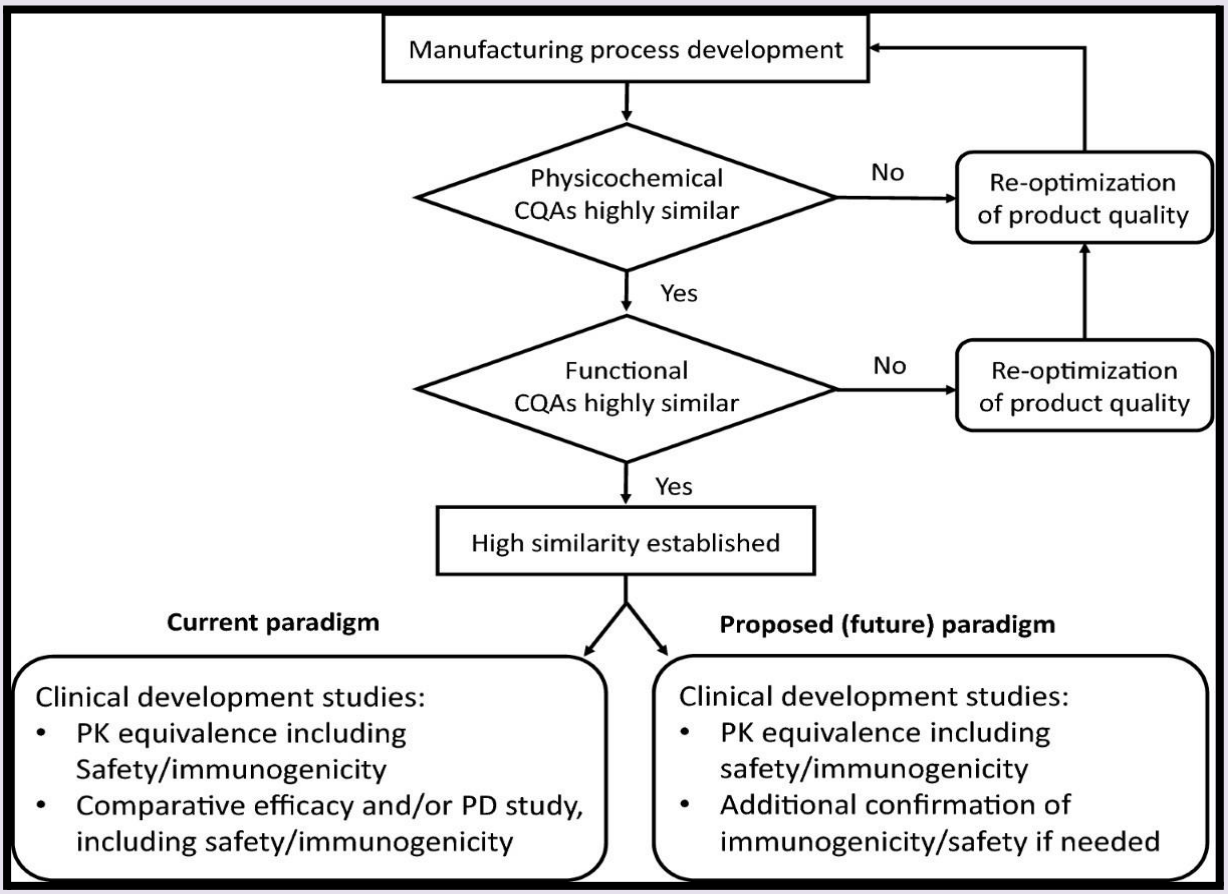

Figure 1. Biosimilar Development and Approval Process

3. Global and Indian Regulatory Framework

The European Medicines Agency (EMA) pioneered biosimilar regulation in 2006, followed by the US FDA in 2015. Both emphasise analytical similarity as the foundation, supported by clinical data when uncertainty remains. The World Health Organization (WHO) guidelines help countries establish pathways (8).

India introduced Guidelines on Similar Biologics in 2016 version as the primary approved framework, with a draft revision released on May 06, 2025. The 2025 draft provides forward looking insights but is not yet enforceable, still pending finalization through the Central Drugs Standard Control Organization (CDSCO) and Department of Biotechnology (DBT). The process includes quality studies, non-clinical tests, PK/PD studies, optional efficacy

trials, and a mandatory Phase IV post-marketing study (at least 200 patients within two years). While progressive, the guidelines remain advisory rather than statutory in some aspects (1,2,9).

4. Current Status of Biosimilars in India

India approved its first biosimilar (hepatitis B vaccine) in 2000 and now has over 100 similar biologics covering insulin glargine, filgrastim, adalimumab, bevacizumab, trastuzumab, and others. Companies such as Biocon, Dr Reddy's, Intas, and Zydus have gained recognition, with some products receiving approvals in regulated markets (1).

The domestic biosimilar market was valued at approximately USD 0.8-1.3 billion in recent years and is projected to reach USD 3.6–5.9 billion by 2030–2033, with a CAGR of 16-21%. Exports are also rising, with the potential to reach USD 4.2 billion by 2030 (10, 11).

Table 2. Selected Biosimilars Approved in India

Product	Active Substance	Main Indications	Name of the Company	Year of launch
Glaritus	Insulin glargine	Diabetes mellitus	Wockhardt	2009
Basalog			Biocon	2014
Grafeel	Filgrastim	Neutropenia	Dr Reddy's Laboratories	2012
Razumab	Ranibizumab	Age-related macular degeneration	Intas Pharmaceuticals	2015
Adfar	Adalimumab	Rheumatoid arthritis	Biocon	2017
Krabeva	Bevacizumab	Various cancers	Biocon	2018
RLS-Nivolumab	Nivolumab	Cancer (trials going on)	Reliance Life Sciences	2026

5. Why India Urgently Needs the Shift

India faces a growing burden of non-communicable diseases. Cancer incidence is rising rapidly, over 100 million people live with diabetes, and autoimmune conditions are common. Originator biologics remain unaffordable for most, straining government schemes like Ayushman Bharat. Biosimilars can reduce treatment costs substantially while maintaining therapeutic outcomes, leading to better adherence, fewer complications, and improved quality

of life. The shift also supports industrial growth, job creation in biotechnology, and India's ambition to become a global biopharma hub (9).

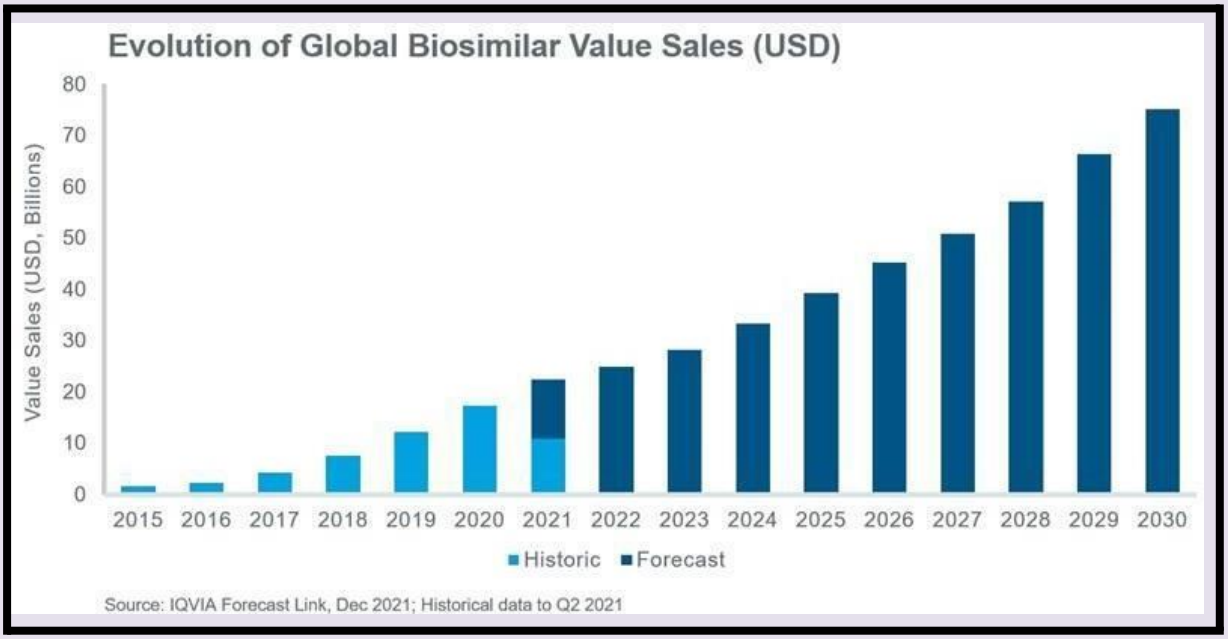

Figure 2. Global Biosimilar Market Growth

6. Regulatory Challenges on the Path Forward

Despite progress, regulatory and implementation hurdles slow India's transition to world-class biosimilars that impede growth and market penetration. The Central Drug Standard Control Organisation (CDSCO) guidelines issued in 2012 for similar biologics are updated periodically, there are gaps in robust post marketing surveillance for immunogenicity and long-term safety, variability in manufacturing processes and frequent scrutiny, all of which increase the costs and delay affordability benefits. Furthermore, limited harmonization with international standards from bodies like FDA or EMA restricts export potential and global competitiveness, despite India's robust production infrastructure.

7. Manufacturing and Analytical Complexity

Biosimilars require advanced analytical tools (mass spectrometry, bioassays) to demonstrate similarity in critical quality attributes. Small process variations can affect glycosylation or aggregation, potentially influencing safety. Many Indian facilities face challenges in infrastructure and skilled manpower. Past regulatory observations from international agencies highlight the need for stronger process validation and data integrity (2, 11).

8. Ambiguity in Guidelines and Enforcement

The 2016 guidelines are not fully legally binding, leading to interpretive differences. Historical approvals of some "intended copies" with limited comparability data have raised

concerns. Issues include inconsistent requirements for local clinical trials, lack of a clear interchangeability policy (unlike the US FDA designation), and coordination challenges between CDSCO and DBT. Court cases and patent disputes further delay market entry (1, 2, 9).

9. Post-Marketing Surveillance and Pharmacovigilance

Rare immunogenicity or potency issues may emerge only after widespread use. India mandates Phase IV studies, yet the Pharmacovigilance Programme of India (PvPI) faces under-reporting, limited traceability (no unique naming or batch tracking specific to biosimilars), and challenges in distinguishing products. Long-term real-world data from Indian patients remain limited for many molecules (3).

10. Physician, Patient, and Stakeholders Confidence

Many clinicians prefer originators due to limited local long-term evidence or fear of nocebo effects. Surveys indicate knowledge gaps about biosimilar development. Patients worry about switching therapies. Without strong education and robust real-world evidence, adoption lags despite cost advantages (4, 5).

11. Global Market Access Barriers

Entering stringent markets (US, EU) requires additional studies to meet higher standards, increasing costs and timelines. Differences in expectations for reference products, clinical data, and pharmacovigilance create duplication of effort (2).

Table 3. Key Regulatory Differences – India vs Major Agencies

Aspect	**India (CDSCO/DBT 2016)**	**EMA / FDA**
Guideline Status	Advisory guidelines	Legally binding
Reference Product	From well-regulated markets allowed	Primarily from own jurisdiction
Clinical Efficacy Trial	Often waivable	Required unless low residual uncertainty
Interchangeability	Not formally defined	Specific pathway (US) with switching data
Post-Marketing Study	Mandatory Phase IV (≥200 patients)	Risk management plan + enhanced surveillance
Pharmacovigilance	Evolving, traceability challenges	Highly structured with identifiers

12. Opportunities and Recommendations

India possesses low-cost manufacturing, a skilled workforce, and a large domestic market. Key recommendations include:

- Making core regulatory requirements legally enforceable while keeping a science-based, risk-proportionate approach.
- Investing in national centres for advanced analytics and immunogenicity testing.
- Strengthening PvPI with biosimilar-specific traceability and mandatory real-world evidence generation.
- Launching nationwide education campaigns for healthcare professionals and patients.
- Promoting public-private partnerships and incentives (e.g., PLI scheme) for next-generation biosimilars and biobetters.
- Pursuing greater harmonisation with EMA, FDA, and WHO for smoother global approvals.

These steps can transform challenges into strengths, enabling India to supply affordable, high-quality biosimilars domestically and internationally. (8)

13. Conclusion

Biologics have transformed modern medicine, yet their cost restricts access for millions in India. Biosimilars offer a proven pathway to affordability and wider reach. India has laid a strong foundation with early approvals, guideline updates, and an emerging industry. However, addressing regulatory ambiguities, strengthening manufacturing and pharmacovigilance capabilities, and building stakeholder trust are essential for a complete and successful shift. With concerted efforts from regulators, industry, clinicians, and policymakers, India can not only meet its healthcare needs but also emerge as a global leader in biosimilar innovation and supply. The time for this shift is now improving lives, reducing economic burden, and securing a competitive edge in biotechnology.

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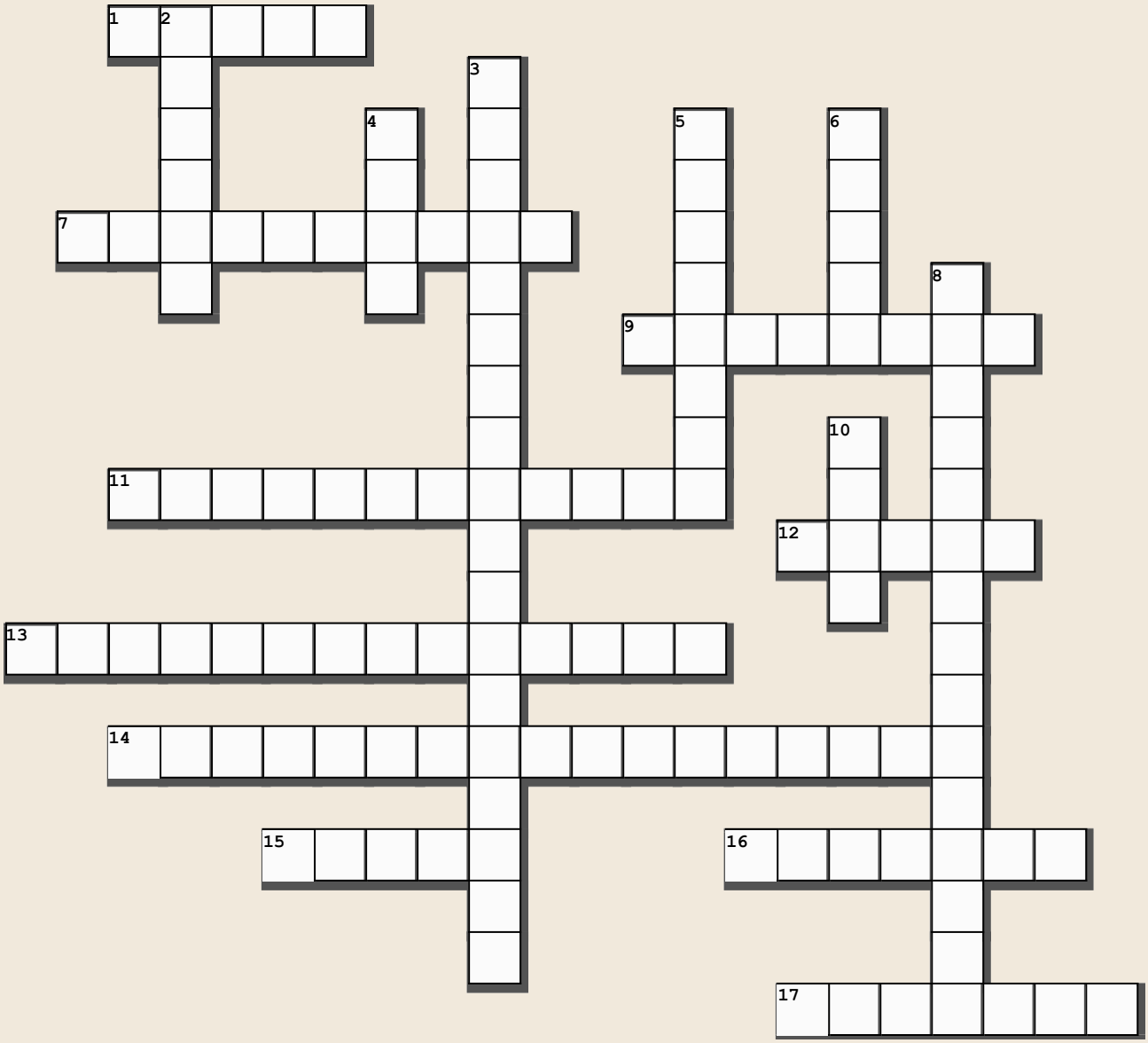

Created using the Crossword Maker on TheTeachersCorner.net

Across

1. Generic semaglutide launched by Dr. Reddy's Laboratories
7. Large-scale cell-based system used for producing biologics
9. Complex protein drugs produced from living cells
11. Indian Biotech Cluster Renowned as a vaccine hub
12. Organization funding biotech startups in India
13. Technique enabling high-yield protein production via gene insertion
14. Indian CDMOs Specializing in ADCs
15. Regulatory authority approving biologics in India
16. Industrial parks supporting biotech manufacturing
17. India's first rituximab biosimilar

Down

2. Indian company known for insulin biosimilars
3. Fastest-growing class dominating biosimilars by type
4. Antibody-drug conjugates abbreviation
5. Structural level crucial for biologic function
6. Outsourcing model where India supports global biologics manufacturing
8. Government scheme to support biologics and biosimilars
10. Promotion of Research and Innovation in Pharma-MedTech Scheme (abbreviation)